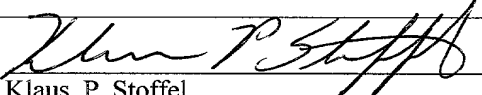


JC10 Rec'd PCT/PTO 21 MAR 2002

FORM PTO-1390 (REV 10-94)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		DOCKET #: 4598-48PUS	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371					
				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/088838	
INTERNATIONAL APPLICATION NO. PCT/EP99/02716		INTERNATIONAL FILING DATE April 22, 1999		PRIORITY DATE CLAIMED September 21, 1998,	
TITLE OF INVENTION Mounting Arrangement Of An Automobile Drive Unit Having A Combustion Engine And A Transmission					
APPLICANT(S) FOR DO/EO/US Ferdinand PIECH; Dietmar LAGIES;					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An EXECUTED oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). <p>Items 11. to 16. Below concern other document(s) or information included:</p> <ol style="list-style-type: none"> 11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input type="checkbox"/> A substitute specification. 15. <input type="checkbox"/> A change of power of attorney and/or address letter. 16. <input checked="" type="checkbox"/> Other items or information (<i>specify</i>): PCT Publication Sheet, Int'l Preliminary Examination Report, Int'l Search Report, PCT Request, Int'l Search Report With Notification re Same 					

U.S. APPLICATION NO (If known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
10/088838		PCT/EP99/02716		4598-48PUS	
17.[x] The following fees are submitted:					
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO \$890.00 International preliminary examination fee paid to USPTO (37 CFR 1.482).....\$710.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$740.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$1040.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)..... \$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$890	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	13 - 20 =	0	x \$18.00	\$	
Independent Claims	1 - 3 =	0	x \$84.00	\$	
Multiple dependent claim(s) (if applicable)			+ \$280.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$890	
Reduction of 1/2 for filing by small entity, if applicable.				\$	
SUBTOTAL =				\$890	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$890	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by the appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
TOTAL FEES ENCLOSED				\$890	
Amount to be refunded:				\$	
charged:				\$	
a. [x] One check in the amount of \$ 890 to cover the above fee is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 03-2412 in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. [x] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-2412. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: <u>Klaus P. Stoffel</u> Cohen, Pontani, Lieberman & Pavane 551 Fifth Avenue, Suite 1210 New York, New York 10176			 <u>Klaus P. Stoffel</u> <u>Registration Number: 31,668</u> <u>March 21, 2002</u> Tel: (212) 687-2770		

10/088838

JOIC REG'D CT/PTO 21 MAR 2002
Attorney Docket # 4598-48PUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Phase PCT Application of

Ferdinand PIECH et al.

International Appln. No.: PCT/EP99/02716

International Filing Date: April 22, 1999

For: Mounting Arrangement Of An Automobile
Drive Unit Having A Combustion Engine And A
Transmission

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

PRELIMINARY AMENDMENT

S I R:

Prior to the issuance of a first Office Action and simultaneously with the filing of the present application, please amend said application as follows:

IN THE SPECIFICATION:

Page 1, after line 2, insert --BACKGROUND OF THE INVENTION--;

the paragraph starting at line 3:

The invention relates to an installation arrangement for a drive unit which is intended for a vehicle and has an internal combustion engine and a transmission.

the paragraph starting at line 38:

In order to reduce the installed height of this drive system, the cylinder row is fitted so that it is inclined to the right when seen in the direction of travel, so that the differential, when seen from above, is arranged lying underneath the cylinder row.

Page 2, after line 11, insert --SUMMARY OF THE INVENTION--;

delete lines 19, 20, 21 and 22 and insert:

--Pursuant to this object, and others which will become apparent hereafter, one aspect of the present invention resides in an installation arrangement for a vehicle drive unit, which installation arrangement includes an internal combustion engine having cylinders arranged in at least two cylinder rows at an angle to one another. One of the cylinder rows is arranged to lie at least substantially horizontally. The installation arrangement further includes a transmission, an engine housing and a crankshaft mounted in the engine housing so as to lie in a longitudinal direction of the engine. A parallel auxiliary shaft is driven by the crankshaft for transmitting power to the transmission and an output drive shaft is in operative connection with the transmission for driving wheels of the vehicle.--

Page 3, after line 17, insert --BRIEF DESCRIPTION OF THE
DRAWINGS--;

the paragraph starting at line 18:

In the figures:

- Figure 1: shows a schematic side view of an installation arrangement;
- Figure 2: shows a plan view thereof;
- Figure 3: shows a schematic view from the front;
- Figure 4: shows a view from the rear of the internal combustion engine only;
- Figure 5: shows a view from the right with respect to Figure 4;
- Figure 6: shows a view from the front of the internal combustion engine only; and
- Figure 7: shows a view from the right with respect to Figure 6.

after line 31, insert --DETAILED DESCRIPTION OF THE
PREFERRED EMBODIMENTS--;

Page 4, the paragraph starting at line 20:

The auxiliary shaft 22 runs in the auxiliary shaft plane NE which is arranged parallel to and at a distance A from the crankshaft plane KE and is identical to a vehicle longitudinal center plane.

Page 5, the paragraph starting at line 46:

The relationships are particularly space-saving and advantageous for installation if the angle W13 between the first cylinder center plane ZME1 and the third cylinder center plane ZME3 is 120 degrees, as a consequence of which the cylinder center plane ZME2, which is arranged on the angle bisector, respectively forms an angle W12 or W23 of 60 degrees to the adjacent cylinder center planes ZME1 and ZME3. Values of between 25 degrees and 35 degrees are advantageous in terms of installation space for the angle W, preferably between 30 and 35 degrees, and in particular 33 degrees.

after line 9, insert the following:

--Thus, while there have been shown and described and pointed out fundamental novel features of the present invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the present invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Substitutions of elements from one described embodiment to another are also fully intended and contemplated. It is also to be understood that the drawings are not necessarily drawn to scale but that they are merely conceptual in nature. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.--

IN THE CLAIMS:

Please cancel claims 1 to 13 and add the following new claims:

14. An installation arrangement for a vehicle drive unit, comprising:

an internal combustion engine, the internal combustion engine having cylinders arranged in at least two cylinder rows at an angle to one another, one of the cylinder rows being arranged to lie at least substantially horizontally;

a transmission;

an engine housing;

a crankshaft mounted in the engine housing so as to lie in a longitudinal direction of the vehicle;

a parallel auxiliary shaft driven by the crankshaft for transmitting power to the transmission;

input drive shafts for vehicle wheels; and

an output driveshaft in operative connection with the transmission and the input drive shafts for driving the vehicle wheels.

15. An arrangement as defined in claim 14, wherein the crankshaft and the auxiliary shaft are each arranged in accommodating, vertically running planes at a distance from one another that an auxiliary shaft plane (NE) which accommodates the auxiliary shaft is identical

to a vehicle longitudinal center plane, and a crankshaft plane (KE) which accommodates the crankshaft is arranged offset at a distance from the auxiliary shaft plane to one side.

16. An arrangement as defined in claim 15, wherein the engine housing has a rear wall, relative to a direction of vehicle travel, with an opening therein, the output drive shaft of the transmission being articulated on the rear wall at the opening, the opening having a center point (MP) arranged at a distance to one side of the vehicle longitudinal center plane such that a the crankshaft plane (KE) lies between the center point (MP) and the auxiliary shaft plane (NE).

17. An arrangement as defined in claim 16, wherein the housing of the internal combustion engine has at least two separation planes (TE1, TE2), the housing including a crank housing upper part which carries the cylinder rows and a bearing traverse adjoining the crank housing upper part along one of the separation planes (TE1), the crankshaft and the auxiliary shaft being mounted in the one separation plane (TE1), and the bearing traverse and a housing lower part adjoining one another in another of the separation planes (TE2).

18. An arrangement as defined in claim 17, wherein the separation planes (TE1, TE2) are arranged parallel to one another, and incline through an angle (W) with respect to the crankshaft plane (KE) and incline with respect to the camshaft plane (NE).

19. An arrangement as defined in claim 18, wherein the substantially horizontal cylinder row has a cylinder center plane (ZME1) arranged at right angles to the crankshaft plane (KE), and so as to run parallel and underneath a transmission plane (GE)

which accommodates the auxiliary shaft, the center point (MP) of the opening being located underneath the transmission plane (GE).

20. An arrangement as defined in claim 19, wherein the branch is a differential arranged in the housing lower part, and further comprising an intermediate shaft connected between the differential and at least one of the input drive shafts, the intermediate shaft having a longitudinal axis (D) that runs underneath the center point (MP).

21. An arrangement as defined in claim 20, wherein the bearing traverse has a bearing neck, the intermediate shaft being arranged to pass through the bearing traverse within the bearing neck.

22. An arrangement as defined in claim 19, wherein the internal combustion engine has a further cylinder row which is arranged between the cylinder rows that are at an angle to one another.

23. An arrangement as defined in claim 22, wherein the cylinder rows are arranged, as seen clockwise in the direction of travel, with the substantially horizontal cylinder row first, the further cylinder row second, followed by a third cylinder row.

24. An arrangement as defined in claim 23, wherein the second and the third cylinder rows are arranged symmetrically with respect to the crankshaft plane (KE) so as to form a V-engine, the second cylinder row having a cylinder center plane (ZME2) that lies

on the angle bisector between the cylinder center plane (ZME1) of the first cylinder row and a cylinder center plane (ZME3) of the third cylinder row.

25. An arrangement as defined in claim 14, wherein the input drive shafts are arranged so that an angle between the input drive shafts and the vehicle longitudinal center plane, in a plan view of the vehicle, is less than 90 degrees.

26. An arrangement as defined in claim 25, wherein, in a view from in front of the vehicle, an angle enclosed between the input drive shafts and the vehicle longitudinal center plane is less than 90 degrees.

REMARKS

The present amendment is submitted prior to the issuance of a first Office Action and simultaneously with the filing of the present application.

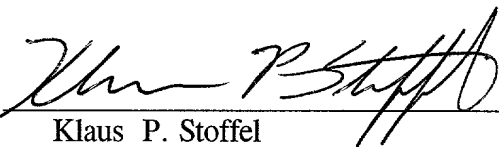
With this amendment applicants have amended the specification, cancelled claims 1 to 13 and added new claims 14 to 25, all in an effort to place the application in better condition for examination.

Favorable action on the present application is respectfully requested.

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By 
Klaus P. Stoffel
Reg. No. 31,668
551 Fifth Avenue, Suite 1210
New York, N.Y. 10176
(212) 687-2770

March 21, 2002

IN THE SPECIFICATION:

Page 1, starting at line 3:

The invention relates to an installation arrangement for a drive unit which is intended for a vehicle and has an internal combustion engine and a transmission[, as claimed in the precharacterizing clause of patent claim 1].

starting at line 38:

In order to reduce the installed height of this [00] drive system, the cylinder row is fitted so that it is inclined to the right when seen in the direction of travel, so that the differential, when seen from above, is arranged lying underneath the cylinder row.

Page 3, the paragraph starting at line 18:

In the figures:

- Figure 1: shows a schematic side view of an installation arrangement[.,,];
- Figure 2: shows a plan view thereof[.,,];
- Figure 3: shows a schematic view from the front[.,,];
- Figure 4: shows a view from the rear[,] of the internal combustion engine only[.,,];
- Figure 5: shows a view from the right with respect to Figure 4[.,,];

Figure 6: shows a view from the front of the internal combustion engine only[,] and

Figure 7: shows a view from the right with respect to Figure 6.

Page 4, the paragraph starting at line 20:

The auxiliary shaft 22 runs in [an] the auxiliary shaft plane NE which is arranged parallel to and at a distance A from the crankshaft plane KE and is identical to a vehicle longitudinal center plane.

Page 5, starting at line 46:

The relationships are particularly space-saving and advantageous for installation if the angle W13 between the first cylinder center plane ZME1 and the third cylinder center plane ZME3 [W13] is 120 degrees, as a consequence of which the cylinder center plane ZME2 [2], which is arranged on the angle bisector, respectively forms an angle W12 or W23 of 60 degrees to the adjacent cylinder center planes ZME1 and ZME3. Values of between 25 degrees and 35 degrees are advantageous in terms of installation space for the angle W, preferably between 30 and 35 degrees, and in particular 33 degrees.

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Legal, Financial, Scientific, Technical and Patent Translations

**11 BROADWAY
NEW YORK, NY 10004**

10/088838

JC10 Rec'd PCT/PTO 21 MAR 2002



Certificate of Accuracy

TRANSLATION

From German into English

**STATE OF NEW YORK }
COUNTY OF NEW YORK } s.s.:**

On this day personally appeared before me
who, after being duly sworn, deposes and states: Elisabeth A. Lucas

That he is a translator of the **German** and English languages by profession and
as such connected with the **LAWYERS' & MERCHANTS' TRANSLATION
BUREAU;**

That he is thoroughly conversant with these languages;

That he has carefully made the attached translation from the original document
written in the **German** language; and

That the attached translation is a true and correct English version of such original,
to the best of his knowledge and belief.

**SUBSCRIBED AND SWORN TO BEFORE ME
THIS**

APR 23 2001

Susan Tapley

Susan Tapley
Notary Public, State of New York
No. 01TA4999804
Qualified in Queens County
Certificate filed in New York County
and Kings County
Commission Expires July 27, 2002

/s/ Lucas

By Express Mail
No. EL 793472185 US

10088838-0340

Installation arrangement for a vehicle drive unit having an internal combustion engine and a transmission

The invention relates to an installation arrangement for a drive unit which is intended for a vehicle and has an internal combustion engine and a transmission, as claimed in the precharacterizing clause of patent claim 1.

EP 0411319 A2, which represents the prior art in this field, discloses a motor vehicle having an inline internal combustion engine, having a crankshaft mounted in a housing of the internal combustion engine and having a parallel auxiliary shaft which is driven by this crankshaft and is used to transmit power to the transmission. The arrangement is in this case designed such that the internal combustion engine, which is in the form of a reciprocating piston internal combustion engine, is installed in the nose of the vehicle transversely between the driven front wheels and with one cylinder row inclined to the rear and with the auxiliary shaft, located in front of the internal combustion engine, being driven via a gear train arranged at the end of the internal combustion engine. This auxiliary shaft transmits the power directly from the internal combustion engine to a transmission, with a transmission output drive shaft that is located behind the internal combustion engine in the direction of travel driving the input drive shaft associated with the front wheels via a branch.

DE 39 206 38 C2 discloses a drive system for a motor vehicle having an inline internal combustion engine fitted in the longitudinal direction, in which a longitudinally fitted transmission is arranged behind the internal combustion engine in the direction of travel, is driven directly by the crankshaft, and whose output drive shaft, which runs at the side alongside the internal combustion engine, drives a branch, which is in the form of a differential, in a housing formed separately on an oil sump. An intermediate shaft which passes through the internal combustion engine oil sump runs between this differential and the vehicle wheel located on the other side of the internal combustion engine.

In order to reduce the installed height of this 00 drive system, the cylinder row is fitted so that it is inclined to the right when seen in the direction of travel, so that the differential, when seen from above, is arranged lying underneath the cylinder row.

Finally, for an internal combustion engine having a V-shaped cylinder arrangement that is symmetrical with respect to a vertical plane and having a longitudinal crankshaft, it is known from EP 0514943 B1 for an arrangement which shortens the installation space of the drive unit comprising the internal combustion engine and the transmission, for the differential (which is driven by the output drive shaft of the transmission which is routed at the side alongside the internal combustion engine) to be arranged lying well forward in the direction of travel, at the side alongside the internal combustion engine.

The invention is based on the object of providing an installation arrangement of this generic type for a drive unit having an internal combustion engine and a transmission in a vehicle, which, with an arrangement that saves installation space, allows a comparatively large number of cylinders and allows a small vehicle overhang in front of the vehicle wheels.

This object is achieved by the features of patent claim 1.

Advantageous refinements of the invention are specified in the dependent claims.

In contrast to the prior art in this generic field, the invention provides for the crankshaft to be arranged such that it runs in the longitudinal direction of the vehicle, and for the cylinders of the internal combustion engine to be arranged in at least two cylinder rows that are at an angle to one another, with one of these cylinder rows being arranged horizontally or essentially horizontally. The term "at an angle" in this case means an angle of 90 degrees +/- 45 degrees, but not an angle in the order of magnitude of 180 degrees, as is used for Boxer internal combustion engines and their arrangement, which occupies a large amount of space, at least in width.

The output drive power from the crankshaft is not emitted directly from the crankshaft to the transmission, but via the auxiliary shaft to the transmission, which is generally arranged centrally in the vehicle, thus allowing the crankshaft to be moved to the side away from this vehicle center, which in turn enlarges the installation space on the opposite side, and this is filled by the horizontal cylinder row. The second cylinder row, which is arranged at an angle to this horizontal cylinder row, may be vertical, but can also be arranged such that it is swiveled laterally to one side or the other from the vehicle longitudinal center plane in order to reduce the installation height further.

In one preferred refinement, the installation space can be further optimized by arranging the auxiliary shaft to run in the vehicle center plane rather than the crankshaft, with a separation plane, which is provided in the housing of the internal combustion engine and bears the auxiliary shaft and the crankshaft, being positioned obliquely, that is to say being arranged inclined to a vertical.

Further advantages and features of the invention will become evident from the exemplary embodiment which is explained in more detail in the following text with reference to a drawing.

Where this disclosure refers to a lying or horizontal arrangement of the cylinder row, then this does not necessarily mean an exactly horizontally lying cylinder row and a minor deviation of the cylinder row position in both directions is, in fact, feasible without departing from the advantages according to the invention.

In the figures:

Figure 1: shows a schematic side view of an installation arrangement,

Figure 2: shows a plan view,

Figure 3: shows a schematic view from the front,

Figure 4: shows a view from the rear, of the internal combustion engine only,

Figure 5: shows a view from the right with respect to Figure 4,

Figure 6: shows a view from the front of the internal combustion engine only, and

Figure 7: shows a view from the right with respect to Figure 6.

A vehicle, of which only the front vehicle area is illustrated schematically in Figure 1, has a drive unit comprising an internal combustion engine 2 and a transmission 4. The drive unit is fitted in the longitudinal direction L of the vehicle, which corresponds to a direction of travel F. Seen clockwise in the direction of travel F, the internal combustion engine 2 has a total of three cylinder rows 6, 8, 10 which each have six cylinders, with the first cylinder row 6 arranged horizontally, and a second cylinder row 8 and a third cylinder row 10 each being arranged at an angle to the first cylinder row 6 such that the second cylinder row 8 is arranged on the angle bisector between the first and third cylinder rows 6 and 10.

The second and third cylinder rows 8 and 10 are provided symmetrically, in the manner of a V-arrangement, with respect to a vertically running crankshaft plane KE which accommodates a crankshaft 12.

The housing (which is designated 14 overall) of the internal combustion engine 2 is formed essentially from three relatively large components, a crankshaft housing upper part 16 which carries the three cylinder rows 6, 8, 10, a bearing traverse 18 mounted adjacent thereto, and a housing lower part 20, which is in turn adjacent to the bearing traverse 18. The crank housing upper part 16 and the bearing traverse 18 are adjacent to one another in a separation plane TE1, in which the crankshaft 12 and an auxiliary shaft 22 driven by it are mounted such that they can rotate.

A second separation plane TE2 runs parallel to the first separation plane TE1 between the bearing traverse 18 and the housing lower part 20; the two separation planes TE1, TE2 are arranged inclined through an angle W with respect to the crankshaft plane KE and the auxiliary shaft plane NE.

The auxiliary shaft 22 runs in an auxiliary shaft plane NE which is arranged parallel to and at a distance A from the crankshaft plane KE and is identical to a vehicle longitudinal center plane.

The auxiliary shaft 22 is driven in a manner which is not shown within the housing 14 by the crankshaft 12, and is used to transmit power to the transmission 4. Located at the rear in the direction of travel F, the transmission 4 has a distributor transmission 24 which, in a manner which will be explained further below, optionally drives rear wheels of the vehicle via an output drive and, via an output drive shaft 26 routed at the front, and in a manner which is still to be described, drives steerable wheels 28 and 30 which are arranged at the side alongside the drive unit.

Opening 34 which has a center point MP is provided on a rear wall 32 of the internal combustion engine 2, located at the rear in the direction of travel F of the vehicle, on which opening 34 the output drive shaft 26 is articulated in a manner which is not shown in any more detail.

The crankshaft plane KE runs on a side S1 of the auxiliary shaft plane NE that is on the right seen in the direction of travel F, while the center point MP is located to the right of this crankshaft plane KE, once again seen in the direction of travel F.

The output drive shaft 26, which is connected to the opening 34, runs rising in the direction of travel F from the distributor transmission 24 and, in the housing lower part 20, drives a short shaft 36 which is mounted and supported there. This shaft 36 drives a branch 40, which is in the form of a differential 38. A pot-like depression 42 is arranged recessed integrally in the housing lower part 20 in order to accommodate this differential 38. On the output drive side, an input drive shaft 44 which leads to the right-hand wheel 30 and an intermediate shaft 48, which leads to an input drive shaft 46 for the left-hand wheel 28, are arranged directly adjacent to the differential 38, seen in the direction of travel F. This intermediate shaft 48 is mounted in the depression 42 at the differential end and its longitudinal axis D extends through a bearing neck 50, formed integrally with the bearing traverse 18, with its longitudinal axis D passing through the separation planes TE1 and TE2. On the output side of this bearing neck 50, the input drive shaft 46 is connected and transmits the drive power to the wheel 28, with both input drive shafts 44, 46 being articulated in the region of the wheel axles 52, 54.

In a plan view of the vehicle, both input drive shafts 44, 46 are positioned angled to the rear with respect to the direction of travel F, that is to say an angle α between the vehicle longitudinal center plane or the auxiliary shaft plane NE and the input drive shafts 44, 46 is less than 90 degrees.

In a view of the vehicle from the front, both input drive shafts 44, 46 are arranged so as to be inclined upward, that is to say with an angle β between the vehicle longitudinal outer plane or the auxiliary shaft plane NE and the input drive shafts 44, 46 that is less than 90 degrees.

As already mentioned initially in the description of the figures, the distributor transmission 24 may have a further output drive in the form of a universally jointed shaft 56, which leads to a rear axle differential 58 from where it drives the rear wheels via universally jointed shafts 60, 62.

A passage 72 for a steering linkage 74 is provided in the housing lower part 20 between the end wall 32 and the depression 42 for the differential 38. This passage 72 is operated from a steering wheel 78 with the interposition of the steering column 76 and transmits the rotary movements from the steering wheel 78 by means of a track rods 80 to the driven wheels 28 and 30.

The relationships are particularly space-saving and advantageous for installation if the angle between the first

cylinder center plane ZME1 and the third cylinder center plane ZME3

W13 is 120 degrees, as a consequence of which the cylinder center plane 2, which is arranged on the angle bisector, respectively forms an angle W12 or W23 of 60 degrees to the adjacent cylinder center planes ZME1 and ZME3.

Values of between 25 degrees and 35 degrees are advantageous in terms of installation space for the angle W, preferably between 30 and 35 degrees, and in particular 33 degrees.

10088338 "032103"

PATENT CLAIMS

1. An installation arrangement for a vehicle drive unit having an internal combustion engine (2) and a transmission (4), having

- a crankshaft (12) mounted in a housing (14) of the internal combustion engine (22) and a parallel auxiliary shaft (22) which is driven by this crankshaft (12) and is used for transmitting power to the transmission (4),
- an output drive shaft (26) from the transmission (4), which, via a branch (40), drives input drive shafts (46, 44) of vehicle wheels (28, 30) which are arranged at the side alongside the drive unit,

characterized in that

- the crankshaft (12) is arranged such that it lies in the longitudinal direction (L) of the vehicle,
- the cylinders of the internal combustion engine (2) are arranged in at least two cylinder rows (6, 8; 6, 10) at an angle to one another, with
- one of these cylinder rows (6) being arranged such that it lies horizontally or essentially horizontally.

2. The arrangement as claimed in claim 1, characterized in that

the crankshaft (12) and the auxiliary shaft (22) are each arranged in accommodating, vertically running planes at a distance from one another in such a manner that an auxiliary shaft plane (NE) which accommodates the auxiliary shaft (22) is identical to a vehicle longitudinal center plane, and a crankshaft plane (KE) which accommodates the crankshaft (12) is arranged offset at a distance (A) from it to one side (S1, S2).

3. The arrangement as claimed in claim 2, characterized in that

the output drive shaft (26) of the transmission is articulated on a rear wall (32), located at the rear in the direction of travel (F) of the vehicle, of the internal combustion engine (2), and the center point (MP) of an opening (34) provided for this purpose in the housing (14) of the internal combustion engine (2) is arranged at a distance to one side (S1, S2) of the vehicle longitudinal center plane such that the crankshaft plane (KE) lies between this center point (MP) and the auxiliary shaft plane (NE).

4. The arrangement as claimed in claim 3, characterized in that the housing (14) of the internal combustion engine (2) has at least two separation planes (TE1, TE2), with a crank housing upper part (16) which carries the cylinder rows (6, 8; 6, 10) and a bearing traverse (18) adjoining one another in the one separation plane (TE1), and the crankshaft (12) and the auxiliary shaft (22) being mounted in this one separation plane (TE1), and with the bearing traverse (18) and a housing lower part (20) adjoining one another in the other separation plane (TE2).

5. The arrangement as claimed in claim 4, characterized in that the separation planes (TE1, TE2) are arranged parallel to one another, and incline through an angle (W) with respect to the crankshaft plane (KE) and incline with respect to the camshaft plane (NE).

6. The arrangement as claimed in claim 5, characterized in that a cylinder center plane (ZME1) of the horizontal or essentially horizontal cylinder row (6) is arranged at right angles to the crankshaft plane (KE), runs parallel and underneath a transmission plane (GE) which accommodates the auxiliary shaft (22), and the center point (MP) of the opening (34) is located underneath the transmission plane (GE).

7. The arrangement as claimed in claim 6, characterized in that the branch (40) is in the form of a differential (38) and is arranged in the housing lower part (20), and a longitudinal axis (D) of an intermediate shaft (48), which is connected between this differential (38) and at least one of the input drive shafts (46), runs underneath the center point (MP).

8. The arrangement as claimed in claim 7, characterized in that the intermediate shaft (48) passes through the bearing traverse (18) within a bearing neck (50) associated with it.

9. The arrangement as claimed in one or more of the preceding claims, characterized in that

the internal combustion engine (2) has a further cylinder row (8; 10) which is arranged between the cylinder rows (6, 10; 6, 8) that are at an angle to one another.

10. The arrangement as claimed in claim 9, characterized in that,

seen clockwise in the direction of travel (F), the cylinder rows are arranged with the horizontal cylinder row (6) first, the further cylinder rows second, followed by the third cylinder rows (8 and 10).

11. The arrangement as claimed in claim 10, characterized in that

the second (8) and the third (10) cylinder row are arranged symmetrically with respect to the crankshaft plane (KE) in the manner of a V-engine, and a cylinder center plane (ZME2) of the second cylinder row (8) lies on the angle bisector between the cylinder center plane (ZME1) of the first and the cylinder center plane (ZME3) of the third cylinder row (10).

12. The arrangement as claimed in one or more of the preceding claims, characterized in that,

in a plan view of the vehicle, the angle (α) enclosed between the input drive shafts (44, 46) and the vehicle longitudinal center plane is less than 90 degrees.

13. The arrangement as claimed in claim 12, characterized in that,

in a view of the vehicle from the front, the angle (β) enclosed between the input drive shaft (44, 46) and the vehicle longitudinal center plane is less than 90 degrees.

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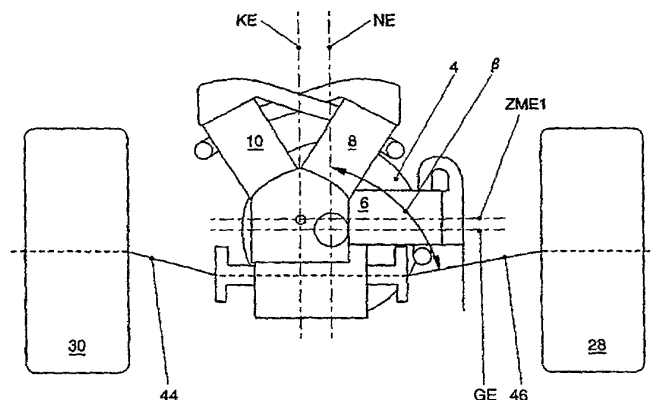


INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation ⁷ : B60K 5/02, F02B 75/22, B60K 17/346	A1	(11) Internationale Veröffentlichungsnummer: WO 00/17003 (43) Internationales Veröffentlichungsdatum: 30. März 2000 (30.03.00)
(21) Internationales Aktenzeichen: PCT/EP99/02716 (22) Internationales Anmeldedatum: 22. April 1999 (22.04.99) (30) Prioritätsdaten: 198 43 258.5 21. September 1998 (21.09.98) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): VOLKSWAGEN AKTIENGESELLSCHAFT [DE/DE]; D-38436 Wolfsburg (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): PIECH, Ferdinand [DE/DE]; Wilhelmitorwall 29, D-38118 Braunschweig (DE). LAGIES, Dietmar [DE/DE]; Zu den Balken 7, D-38448 Wolfsburg (DE). (74) Gemeinsamer Vertreter: VOLKSWAGEN AKTIENGESELLSCHAFT; Brieffach 1770, D-38436 Wolfsburg (DE).	(81) Bestimmungsstaaten: CN, JP, KR, US, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Veröffentlicht Mit internationalem Recherchenbericht.	

(54) Title: MOUNTING ARRANGEMENT OF AN AUTOMOBILE DRIVE UNIT HAVING A COMBUSTION ENGINE AND A TRANSMISSION

(54) Bezeichnung: EINBAUANORDNUNG EINER EINEN VERBRENNUNGSMOTOR UND EIN GETRIEBE AUFWEISENDEN ANTRIEBSEINHEIT EINES FAHRZEUGES



(57) Abstract

The invention aims at providing a compact mounting arrangement for an automobile drive unit consisting of a combustion engine and a transmission. According to the invention, the crankshaft of the combustion engine and an auxiliary shaft driven by said crankshaft extend in the longitudinal direction of the vehicle, the cylinders of the combustion engine are subdivided into at least two rows forming an angle in relation to each other, wherein one of said cylinder rows is disposed in a horizontal or substantially horizontal manner.

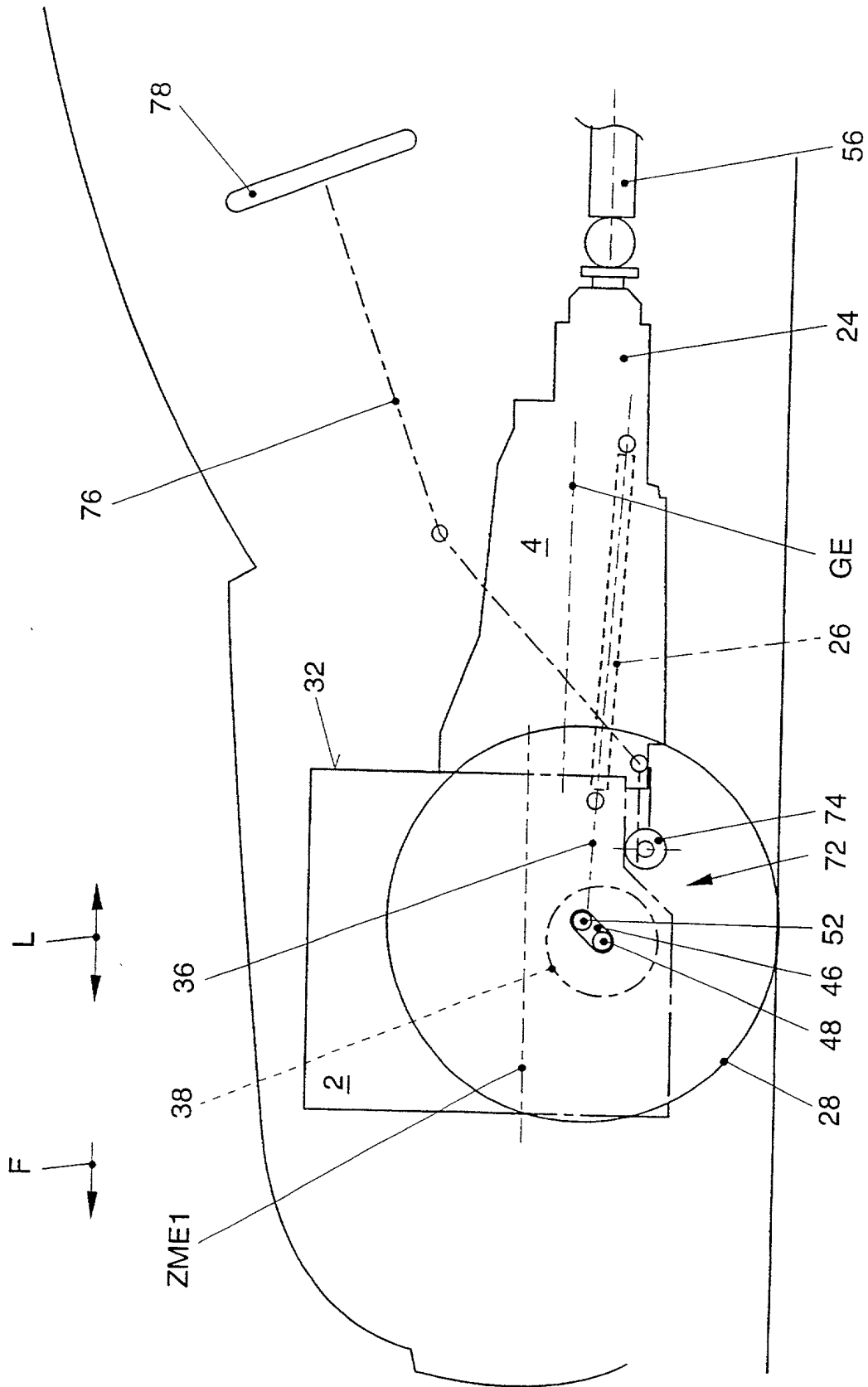


FIG. 1

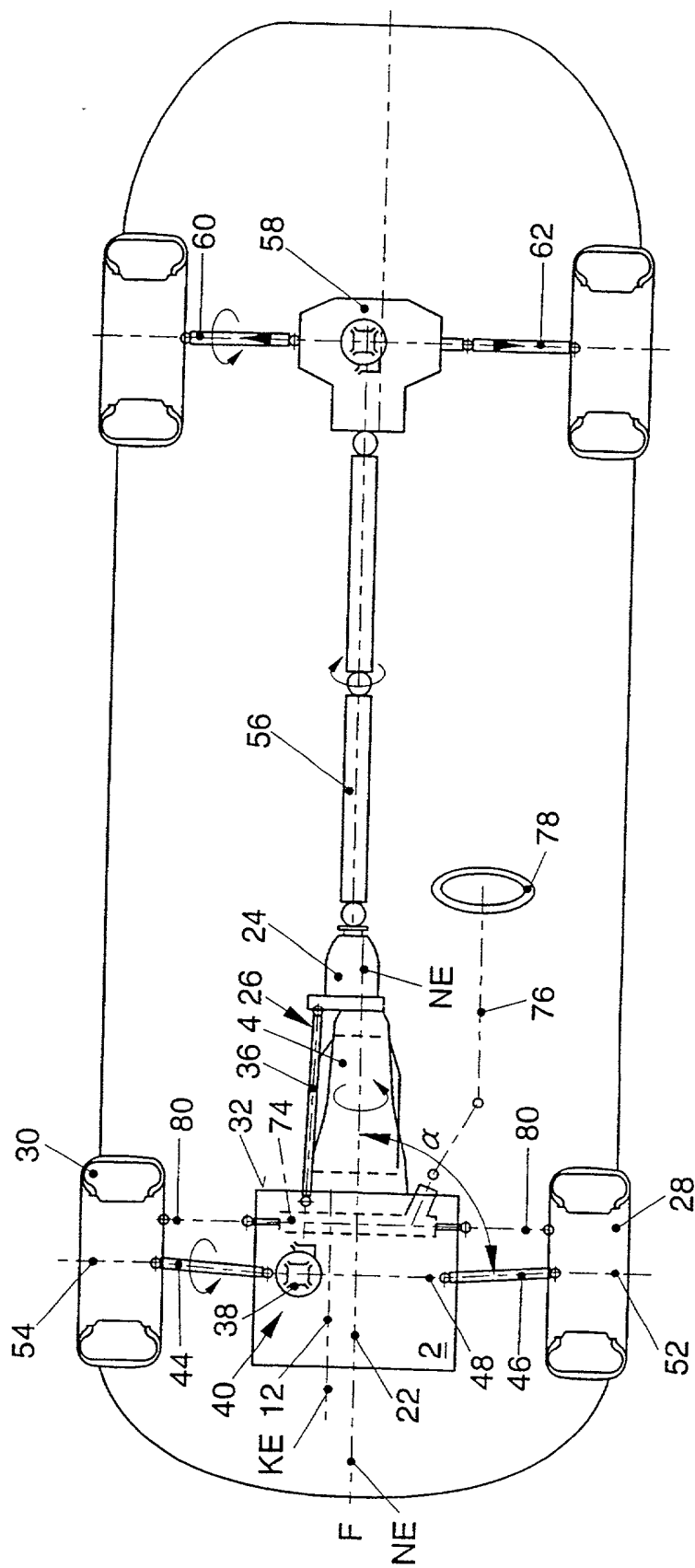


FIG. 2

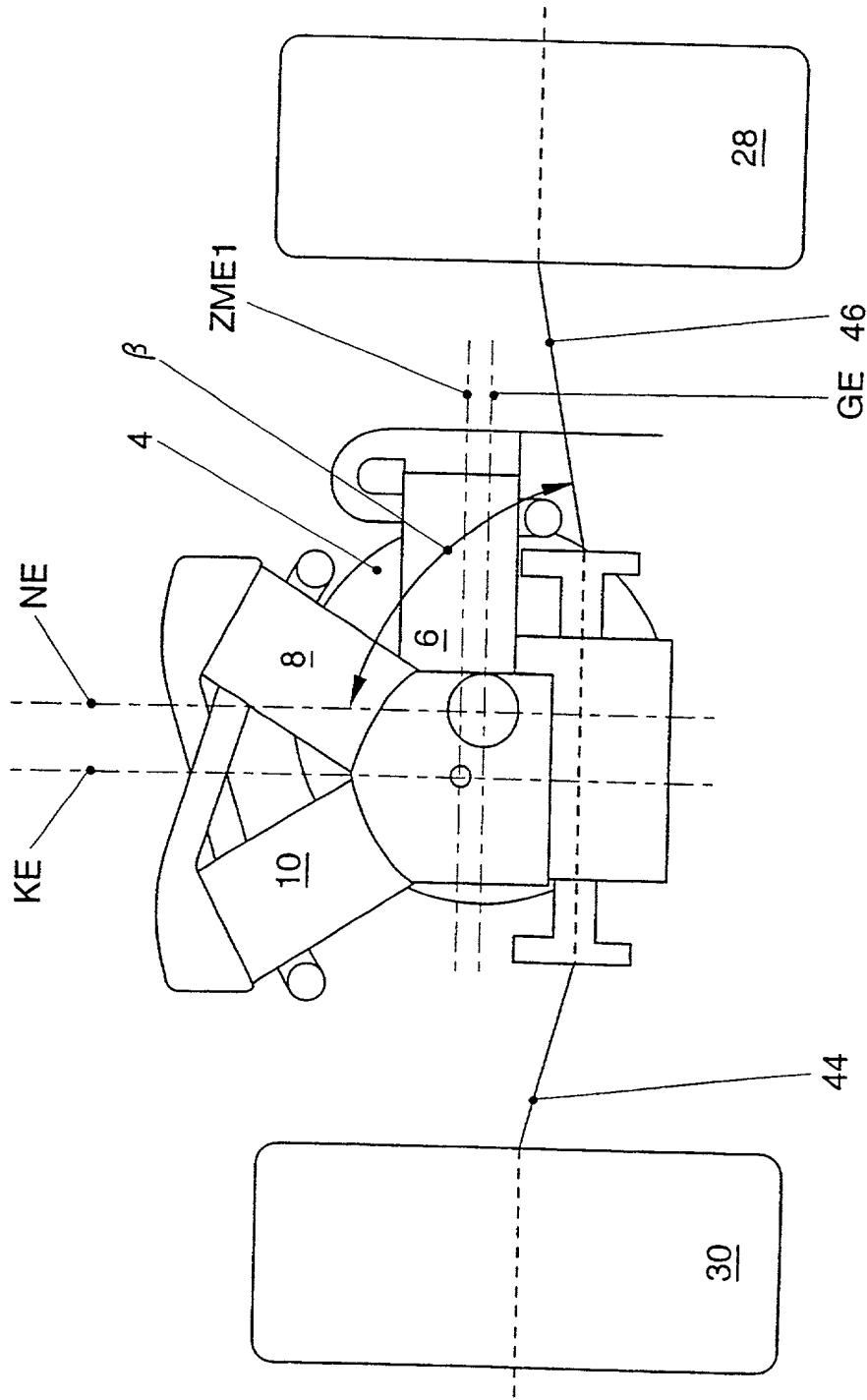


FIG. 3

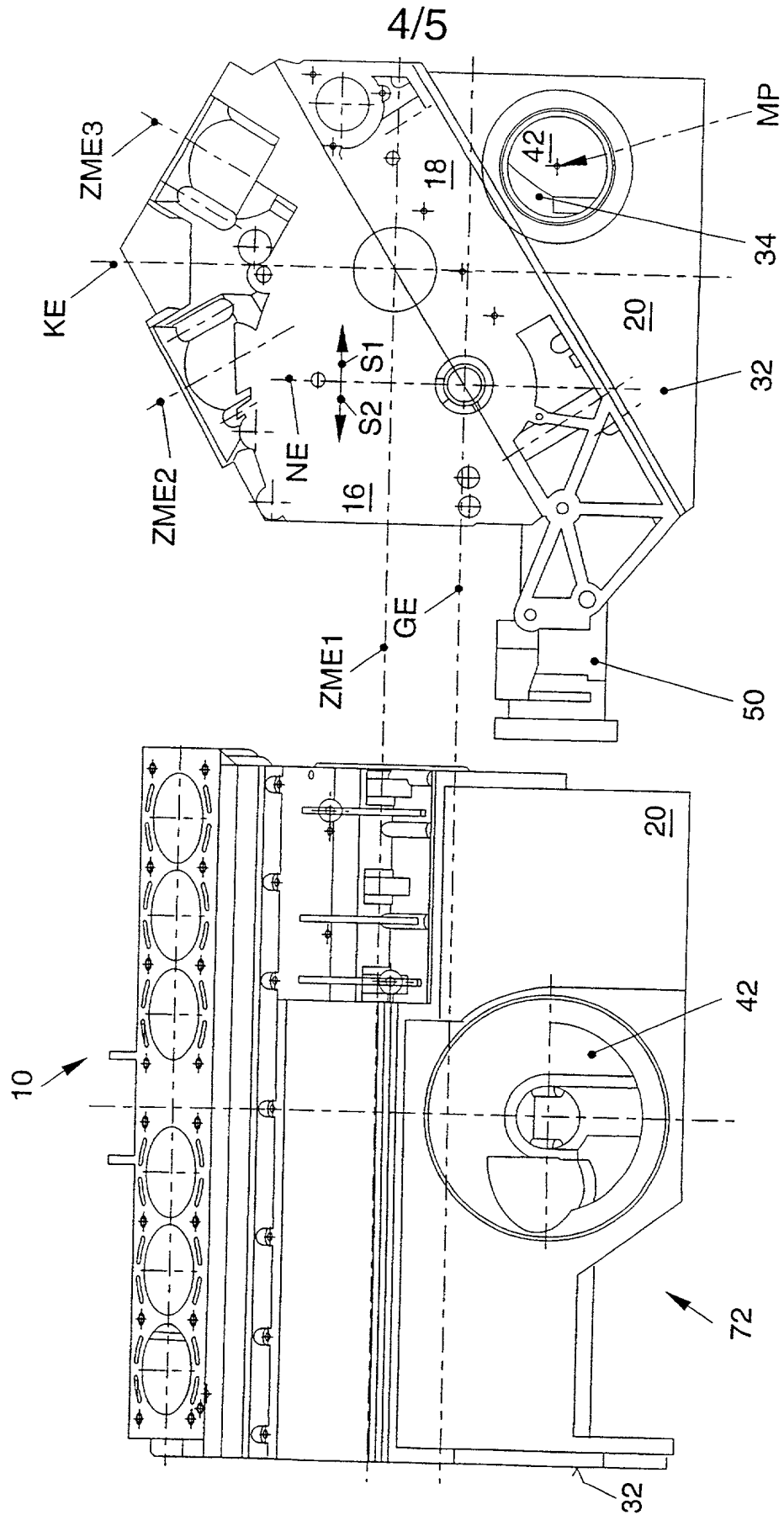


FIG. 4

FIG. 5

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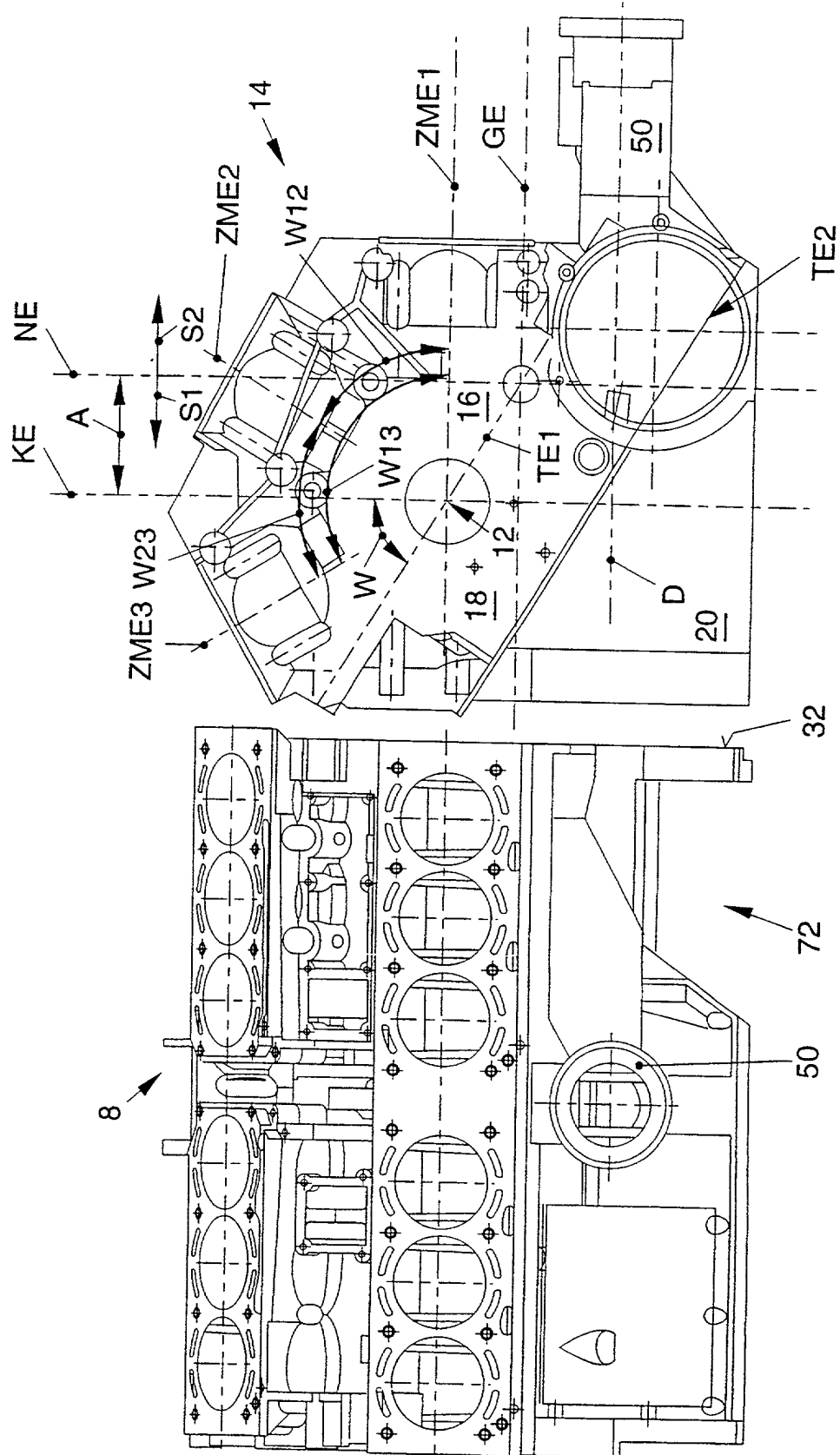


FIG. 6

FIG. 7

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
Includes Reference to PCT International ApplicationsAttorney's Docket
No. 4598-48PUS

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**MOUNTING ARRANGEMENT OF AN AUTOMOBILE DRIVE UNIT HAVING
A COMBUSTION ENGINE AND A TRANSMISSION**

the specification of which (check only one item below)

☒ is attached hereto☐ was filed as United States application

Serial No. _

on _

and was amended

on _ (if applicable).

☒ was filed as PCT international applicationNumber PCT/EP99/02716on April 22, 1999

and was amended under PCT Article 19

on _ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of the application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

PRIOR FOREIGN/PCT APPLICATIONS AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

Country (if PCT, indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 U.S.C. 119	
Germany	198 43 258.5	September 21, 1998	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PCT	PCT/EP99/02716	April 22, 1999	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

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Combined Declaration for Patent Application and Power of Attorney (Continued)
 (Includes Reference to PCT International Applications)

 Attorney's Docket No.
4598-48PUS

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

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U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)		
PCT/EP99/02716	April 22, 1999		X	

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (List name and registration number)

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(Includes Reference to PCT International Applications)

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	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201

SIGNATURE OF INVENTOR 202

SIGNATURE OF INVENTOR 203

DATE

04/25/01

DATE

04/10/2001

DATE